

A Study of Nutritional status and Dietary intake of Lactating women in Benghazi, Libya

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ABSTRACT

Breastfeeding is a natural process that provides essential nutrition for the healthy growth and development of infants. Proper maternal nutrition is crucial for maintaining both the mother's and the infant's health. This study aimed to assess the nutritional status of lactating women in Benghazi, Libya. A cross-sectional study was conducted with a randomly selected sample of N=202 lactating women from Benghazi Medical Center and Pediatric Hospital. Data were collected through a self-administered questionnaire and a 24-hour dietary recall, and analyzed using SPSS.

The majority of participants were aged 30±5 years, with 62.9% having an income between 500 and 1,000 Libyan dinars. About 64% of the women were either overweight or obese. The mean daily energy intake was 1571±581 kcal, with carbohydrate and protein intake significantly below the recommended levels, while fat intake was close to the recommended range. Additionally, a large proportion of the women were anemic, particularly those with low incomes and those breastfeeding for more than six months. The current study concluded that most lactating women were consuming nearly sufficient amounts of fat, but their intake of energy, carbohydrates, and protein fell below the recommended dietary allowances. Over half of the women were overweight or obese, and a majority was anemic, with higher prevalence among low-income women and those breastfeeding longer. Nutritional interventions and education programs are recommended to improve the dietary habits and overall health of lactating women.

Keywords: Lactating women; Feeding practice; Nutritional status; Nutrient intake; Nutrient requirement; Obesity; Iron deficiency; Dietary intake; BMI; Eating habits.

1. Introduction

Lactation is the phase in a newborn's life where breast milk serves as the primary source of nourishment, providing all the necessary nutrients for growth [1]. Human breast milk is specially designed to meet the nutritional needs of infants, which is why organizations like the World Health Organization (WHO), the American Academy of Pediatrics (AAP), and Health Canada recommend exclusive breastfeeding for the first six months. After this period, solid foods should be introduced while continuing breastfeeding until at least 12 to 24 months [2,3].

Despite these guidelines, breastfeeding rates remain low in some countries, with only about 33% and 13% of U.S. infants being exclusively breastfed at three and six months, respectively [4]. The nutritional requirements during infancy are higher than at any other life stage, and breast milk composition changes over time to meet the evolving needs of the child [5,6]. Although a mother's diet can influence the fatty acid profile and certain micronutrient levels in her milk, it generally does not affect the volume or overall quality [7]. Even malnourished mothers produce breast milk that has high nutritional and immunological value [8]. However, in situations like famines or natural disasters, the WHO recommends supporting breastfeeding while also supplementing the mother's diet [7,8].

The nutrients in breast milk are derived from both the mother's diet and her stored body reserves, meaning women who lack sufficient dietary intake may face deficiencies in vitamins and minerals that are critical for health [9]. The prevalence of such deficiencies varies by region, culture, and socioeconomic factors, but these can be addressed through dietary improvements or supplementation [10,11].

Breastfeeding mothers need to adjust their calorie and fluid intake to support milk production. Typically, lactating women require an additional 500 calories per day compared to non-pregnant women. The recommended total daily

caloric intake for breastfeeding mothers ranges between 2,300 and 2,500 calories for single infants, and 2,600 to 3,000 calories for twins. While protein needs increase slightly during lactation, a low energy intake can lead to protein being used for energy, which is not ideal. It is also important that carbohydrates and fats are consumed in sufficient quantities to meet daily requirements [12-14].

Several factors influence breastfeeding success, including both maternal and infant participation in the process. A mother's age, postpartum weight, activity level, metabolism, and the baby's suckling ability can all impact breastfeeding. The duration and frequency of breastfeeding also significantly affect the mother's nutritional needs, though these factors are often overlooked. Lactation success starts during pregnancy when women need to build nutrient reserves in preparation for nursing [13,15,16]. Psychological factors, such as a mother's desire and willingness to breastfeed, play an essential role in achieving breastfeeding goals. Therefore, proper support from health professionals and a conducive environment are crucial [15].

Breastfeeding offers many health benefits to both mother and child. Infants who are breastfed tend to have lower rates of infectious diseases and experience milder cases of conditions like respiratory infections and diarrhea compared to those who are formula-fed [17]. The unique composition of breast milk is specifically tailored to human infants, making it the ideal food for early development. Additionally, breastfed infants often gain weight more slowly in the first year, which may reduce the risk of childhood obesity [18,19]. Breastfeeding has also been linked to a lower risk of certain chronic diseases, such as diabetes, celiac disease, and asthma, and it can result in lower medical costs for families [20-22].

Despite the importance of breastfeeding and maternal nutrition, few studies have examined the nutritional status of lactating women in Benghazi. This study aims to fill that gap by assessing the nutritional status of lactating women in this region, and:

- 1- To study dietary pattern of lactating women and lifestyle,
- 2- To determine the macronutrients intake and compare with RDA of lactating women,
- 3- To examine the nutrients deficiency among lactating women.

2. Methodology

2.1. Study population

A cross-sectional study was conducted on lactating mothers who visited the Benghazi Medical and Center, Pediatric Hospital between January and February 2022. The sample consisted of N=202 randomly selected lactating women, aged 18 to 45 yrs. Participants completed a pretested questionnaire, and their height and weight were measured. The final response rate for the study was 100%, with all 202 questionnaires completed.

2.2. Questionnaire

The questionnaire used in this study contained 28 items divided into eight sections. The first section collected personal information, such as age, education level, occupation, income, marital status, and number of children. The second section focused on the health status of the participants, while the third addressed breastfeeding practices,

including the number of times and duration of breastfeeding, and the type of feeding. The fourth section inquired about lifestyle changes during lactation. The fifth and sixth sections covered dietary history and the types of food consumed. The final sections included measurements of height and weight, as well as a 24-hour dietary recall table and laboratory investigations.

2.3. Measurement

The researchers measured participants' weight and height after the questionnaire was completed. Height was recorded to the nearest 0.1 cm using a calibrated wall-attached scale, and weight was measured to the nearest 0.2 kg using a weighing machine. Participants were weighed wearing light clothing and no shoes. Body mass index (BMI) was calculated using the formula: weight in kilograms divided by height in meters squared. The BMI was categorized according to the World Health Organization's (WHO) classification system. 24 hrs recall was used to determine the food intake per day, and food composition to calculate energy, carbohydrate, protein, fat contents in their diet.

2.4. Statistical analysis

Data were analyzed using SPSS version 17.0. Descriptive statistics, including frequencies and the Chi-square test, were used to compare variables such as anemia, income, breastfeeding duration, formula feeding, and supplement use. A one-sample t-test was applied to determine differences between the participants' energy and nutrient intake and the Recommended Dietary Allowance (RDA). All p-values less than 0.05 were considered statistically significant.

2.5. Ethical Statement

The study was approved by the University of Benghazi. To ensure confidentiality, the questionnaires were anonymous, and no personal identifiers were used.

3. Results

3.1. Demographical characteristics of lactating women

A total of 202 lactating women participated in the study, with an average age of 30 ± 5 years. Over half (54.9%) of the participants had attained a university education, while 12% had only completed primary school. The majority of women (58%) were housewives, and more than half (62.9%) had an income ranging from 500 to 1,000 Libyan dinars. Most of the participants (94%) were married, and 41.6% had more than three children (see Table 1).

Table 1. Demographical Characteristics of Lactating women

Characteristics	N	%
Education level:		
Primary	25	12.4%
Secondary	66	32.7%
University	111	54.9%

Occupation:		
Students	18	8.9%
Employee	66	32.7%
Housewife	118	58.4%
Income:		
500-1000	127	62.9%
1000-1500	59	29.2%
More than 1500	16	7.9%
Social status:		
Married	190	94.1%
Divorced	8	4%
Widowed	4	2%
Number of children:		
1	26	12.9%
2	40	19.8%
3	52	25.7%
More than 3	84	41.6%

In terms of medical history, 63% of the women reported having thyroid disease, and a similar percentage 13% had conditions like asthma, gastritis, and iron deficiency anemia. According to BMI measurements, 64% of the women were classified as overweight or obese, while 43% had a normal body weight. No significant relationship was found between BMI and the demographic characteristics of the women ($p\text{-value} < 0.05$) (see Figures 1 and 2).

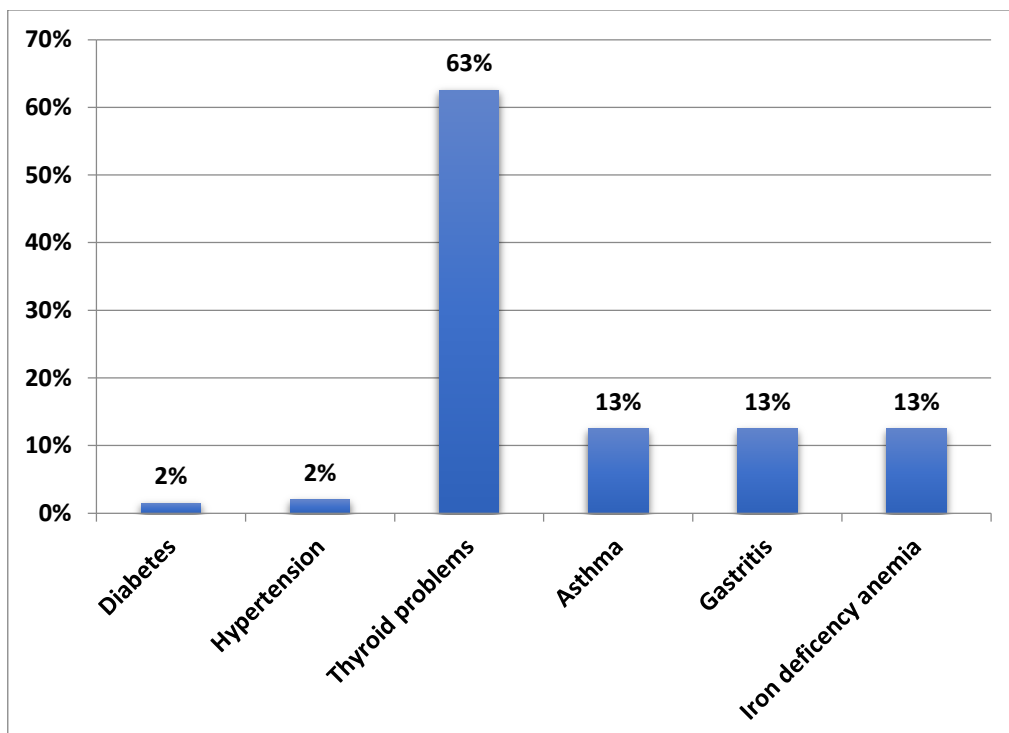


Figure 1. Distribution of diseases among lactating women

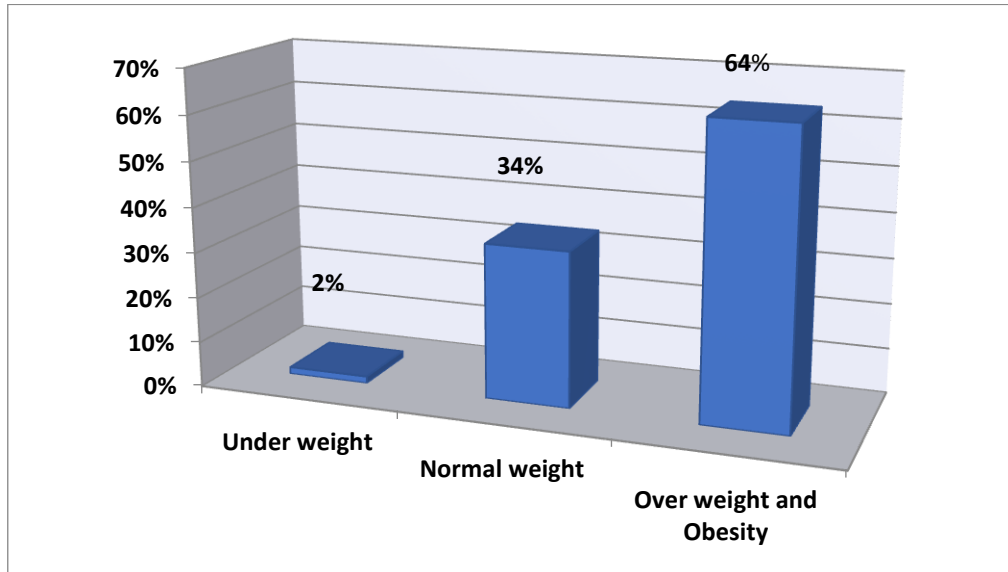


Figure 2. Distribution of BMI among lactating women

3.2. Breastfeeding Practices

Most of the lactating women (61.9%) breastfed their children more than eight times per day, and 41.6% continued breastfeeding for six months to one year. Additionally, 23.8% continued breastfeeding for up to two years. More than half of the participants (56.4%) supplemented breastfeeding with formula, and 57.1% of these women fed their children less formula than breast milk, while 42.9% used more formula than breast milk (Table 2).

Table 2. Feeding practicing among lactating women

Feeding practicing	N	%
Number of breastfeeding:		
8 <	77	38.1%
8 >	125	61.9%
Duration of breast feeding:		
Less than 6 months	70	34.7%
6 months to 1 yrs.	84	41.6%
More than 2 yrs.	48	23.8%
Formula feeding:		
Yes	114	56.4%
No	88	43.6%
Quantity of formula feeding:		
More than breastfeeding	51	42.9%
Less than breastfeeding	68	57.1%

3.3. Dietary Habits

During lactation, 83.7% of women reported an increased appetite, while 16.3% noted no change. In terms of weight changes, 46% experienced weight gain, 32.7% lost weight, and 21.3% reported no change. The majority (91.6%) of

the women experienced increased thirst, and nearly all (91.8%) reported consuming all types of food. However, 8.4% avoided certain foods, such as red meat, fish, fried foods, and dairy products. Most women (65.5%) ate more than three meals a day, and there was a significant association between obesity and meal frequency, with obese women consuming more meals per day than those with normal weight ($p=0.001$). Only 3.5% of the women reported food allergies, with the most common allergen being fish (57.1%). Only 22.8% of the women were taking supplements. Among those, 41.3% were taking iron supplements, 10.9% were taking Omega-3, and 30.4% were using multivitamins with iron (Table 3).

Table 3. Description of dietary history of lactating women

Dietary history	Frequency N	Percentage %
Increase appetite:		
Yes	169	83.7%
No	33	16.3%
Weight change:		
Increase	93	46%
Decrease	66	32.7%
Without change	43	21.3%
Increase thirst:		
Yes	185	91.6%
No	17	8.4%
Eating all types of foods:		
Yes	185	91.8%
No	17	8.4%
Type of avoiding foods:		
Red meat	3	17.6%
Fish	5	29.4%
Fried food	6	35.3%
Milk and dairy products	3	17.6%
Number of meals per day**		
Less than 3 meals	69	34.5%
More than 3 meals	131	65.5%
Food allergy:		
Yes	7	3.5%
No	195	96.5%
Supplements use:		
Yes	46	22.8%
No	156	77.2%

**Significant association by Chi-square test $p\text{-value} > 0.05$

3.4. Dietary intake of lactating women

Table 4 shows that the mean energy intake of the participants was 1571 ± 581 kcal/day, which was significantly lower than the recommended 2,000-2,500 kcal/day (p-value $t < 0.001$). The mean carbohydrate and protein intake was also below the recommended levels, with carbohydrate intake at 53.8 ± 9 g/day (compared to the recommended 210 g/day) and protein intake at 17.2 ± 6.7 g/day (compared to the recommended 71 g/day) (p-value $t = 0.00$). However, fat intake (30.31 ± 8.9 g/day) was near the recommended level of 29 g/day, there was no significant different in fat intake.

Table 4. Energy and macronutrients intake among lactating women

Nutrients	Mean	Standard Deviation	RDA	p-value
Energy kcal/day*	1571	581	2000-2500 kcal/day	0.00
Carbohydrate g/day*	53.8	9	210 g/day	0.000
Protein g/day*	17.2	7	71 g/day	0.000
Fat g/day	30.13	9	29 g/day	0.073

*significant different by one simple t test p-value=0.05

3.5. Laboratory investigation of lactating women

More than half (52%) of the lactating women were anemic, with an average hemoglobin level of 11 g/dl. Serum calcium levels were within the normal range, averaging 9.4 mg/dl. There was a significant relationship between socioeconomic status and anemia, with anemia more prevalent among women with low income (74%) compared to those with higher income (20.3%) (p=0.04). Additionally, women breastfeeding for more than six months were more likely to be anemic (56%) compared to those breastfeeding for a shorter duration (44%) (p=0.012). Formula-fed children had mothers with a higher incidence of anemia (51%) compared to mothers who exclusively breastfed (49%) (p=0.021). No significant relationship was found between supplement intake and anemia (p=0.520).

Table 5. The relation between income, feeding practice and distribution of anemia among participants

Variables	Anaemia		p-value
	Yes	No	
Income**	74%	20.3%	0.04
Duration of breast feeding**	< 6 months	> 6 months	0.012
	44%	56%	
Formula feeding**	Yes	No	0.021
	49%	51%	
Supplements use	Yes	No	0.520
	12.7%	39.7%	

**Significant relation by Chi-square p-value > 0.05

4. Discussion

This study focused on the nutritional status of 202 lactating women attending Benghazi Medical Center and surrounding communities. The mean age of the participants, 30 ± 5 years, aligns with findings from similar studies in countries like Nigeria, where lactating women showed similar demographic characteristics [23-25]. Most of the women in this study had a university-level education and were housewives with moderate incomes, further reflecting trends in developing regions, where income plays a significant role in determining access to food and, consequently, maternal and child nutrition [25-27].

A concerning finding is that over half of the participants were either overweight or obese. This aligns with cultural norms in some African societies, where higher body weight is often seen as a sign of wealth and good living [25,28]. Similarly, studies conducted in Nigeria and other developing countries indicate that many lactating women fall within the overweight or obese categories, underscoring the need for nutritional education [29].

Breastfeeding practices in this study showed that the majority of women were breastfeeding their infants frequently, with many continuing up to one year. However, a significant proportion also relied on formula feeding. While breastfeeding offers undeniable benefits, including protection against infections, the duration and exclusivity of breastfeeding are critical [30]. For instance, studies have shown that longer breastfeeding durations are associated with reduced childhood obesity and other health benefits, making it vital to promote exclusive breastfeeding for at least six months [31-32].

Dietary habits among the women revealed increased appetite and weight gain during lactation, with a majority consuming more than three meals per day. However, despite this, their overall nutrient intake was far below recommended levels, particularly for energy, carbohydrates, and protein. Similar results were demonstrated by previous studies worldwide [33-36]. This highlights the need for targeted interventions to ensure that lactating women consume adequate calories and nutrients to meet both their own and their infant's needs.

Supplement use among participants was limited, with a small number taking iron, Omega-3, and multivitamin supplements. This is concerning given the high prevalence of anemia—over 50% of the women were anemic, especially those with low incomes and those breastfeeding for extended periods. Anemia in lactating mothers not only affects their own health but can also impair the nutritional quality of breast milk, thus influencing infant health. A study done in rural Zambia on nutrient intake of women determined that they did not have higher intakes of macro- and micronutrients during lactation [35]. According to Ethiopian Demographic and Health Survey (EDHS), indicated the changes in the prevalence of anemia among lactating mothers in Ethiopia and that is significantly related to socioeconomic and distribution of anemia among lactating women [37-38]. The findings emphasize the need for improved nutritional interventions targeting lactating women, as poor nutrition can have significant repercussions on both maternal and infant health.

5. Conclusion

In summary, the study found that while many lactating women were consuming sufficient fats, their intake of energy, carbohydrates, and protein was inadequate, failing to meet the Recommended Dietary Allowance (RDA).

Furthermore, more than half of the women were either overweight or obese, and anemia was widespread, particularly among low-income mothers and those breastfeeding for longer durations.

6. Recommendations

- 1- Undertake longitudinal studies focusing on lactating women across various regions in Libya to provide a comprehensive understanding of their nutritional status over time.
- 2- Develop and implement effective screening tools to assess and monitor the nutritional status of lactating women.
- 3- Conducting educational programs aimed at enhancing awareness and promoting healthy eating behaviors among lactating women.

Declarations

Source of Funding

This study did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing Interests Statement

The authors declare no competing financial, professional, or personal interests.

Consent for publication

The authors declare that they consented to the publication of this study.

Ethical Approval

This study was approved by the University of Benghazi. To ensure confidentiality, the questionnaires were anonymous, and no personal identifiers were used.

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